REMARKS

In the Office Action, the Examiner rejected Claims 1-20, which are all of the pending claims, under 35 U.S.C. 103 as being unpatentable over the prior art, principally U.S. Patents 5,513,029 (Roberts) and 6,208,441 (Jones, et al.). Claims 1, 3, 11 and 18 were further rejected under 35 U.S.C. 112, first, paragraph, as failing to comply with the written description requirement.

With respect to the rejections of the claims under 35 U.S.C. 103, Claims 1, 2 and 18-20 were rejected as being unpatentable over Roberts in view of Jones, et al. and further in view of U.S. Patent 5,777,773 (Epworth, et al). Claims 3, 7-11 and 15-17 were rejected as being unpatentable over Roberts in view of Epworth; and Claims 4-6 and 12-14 were rejected as being unpatentable over Roberts in view of Epworth, et al. and Jones, et al.

Applicants herein ask that independent Claims 1, 3, 11 and 18 be amended to better define the subject matters of these claims. Also, Claim 9 is being amended to improve the language of the claim. The rejection of Claims 1, 3, 11 and 18 under 35 U.S.C. 112 is respectfully traversed.

For the reasons discussed below, Claims 1, 3, 11 and 18 fully comply with the requirements of 35 U.S.C. 112, and all of Claims 1-20 patentably distinguish over the prior art. The Examiner is, accordingly, respectfully requested to enter this Amendment, to reconsider and to withdraw the rejection of Claims 1, 3, 4 and 18 under 35 U.S.C. 112 and the rejections of Claims 1-20 under 35 U.S.C. 103, and to allow Claims 1-20.

The present invention, generally, relates to optical networks that carry multiple optical signals at multiple wavelengths. As discussed in detail in the present application, optical networks encode information to be transmitted and received, and a stable optical power level is vital to set and maintain the threshold of the code for digital data. Various schemes have been proposed to achieve

this stable optical power level. However, these schemes are often inaccurate and can be expensive to implement in networks that carry many wavelengths with dense wavelength spacing.

The present invention is able to achieve this stable optical power level through the unique use of an optical filter. More specifically, in accordance with this invention, the multiple wavelengths, each in an associated channel, are directed through the optical filter, and the bandpass of the filter is dithered about the wavelength of each channel in use in the network to obtain a measurement of the optical transfer function in the network at any instant in real time. In this way, any changes in the optical transfer function can be tracked, and feedback signals are used to compensate for those changes.

The filter, in effect, functions as part of a very inexpensive real time optical spectrum analyzer. This, in turn, allows for very fast response corrections and enables the use of networks with more wavelengths spaced more closely together.

In rejecting Claims 1 and 3 under 35 U.S.C. 112, the Examiner argued that the specification does not disclose adjusting wavelengths of optical signals transmitted through a dithered optical bandpass filter, as recited in Claims 1 and 3.

The specification at several places, including page 3, lines 15-29, describes conducting a set of optical signals through a filter having a bandpass function, and dithering that bandpass about the wavelengths of each of said set of signals. This portion of the specification also indicates that this is done to adjust the network or the set of optical signals to compensate for changes.

On page 8, lines 8-21, the specification also explains a variety of compensation schemes. One of these, mentioned on page 8, lines 9 and 10, is to change the optical power or wavelength of the remaining wavelengths at the transmit or add side of the network. It is clear that these wavelengths that are being changed are the wavelengths of the optical signals being conducted

through the bandpass filter. Thus, when the specification is read as a whole, there is a written description, within the meaning of 35 U.S.C. 12, of changing or adjusting the wavelengths of the optical signals conducted through the filter whose bandpass is being dithered, as described in Claims 1 and 3.

With regard to Claims 11 and 18, the Examiner argued in the Office Action that the specification does not disclose dithering a filter bandpass where the one dithered bandpass filter filters multiple channels/wavelengths as a set of signal. The Examiner further commented that page 3, lines 18-21 of the specification only discloses the network as a whole having a set of optical signals, and tracking changes to the set of signals by passing each of the signals through a filter having a bandpass function.

The portion of the specification on page 3, lines 14-29, discloses more. In particular, on page 3, lines 19-20, the specification expressly describes "dithering the filter bandpass about the wavelengths of each of said set of signals..." (emphasis added). Page 3, lines 25-26 of the specification goes on to describe "dithering the optical filter bandpass about the center wavelength of each DWDM channel in use" (emphasis added). Thus, among other features, the specification does provide a written description of passing a set of optical signals through one filter having a bandpass function, and wherein the wavelengths of those optical signals are dithered relative to the filter bandpass.

In light of the above-discussion, the specification provides the appropriate written description, within the meaning of 35 U.S.C. 112, of the subject matter of Claims 1, 3, 11 and 18. The Examiner is, consequently, asked to reconsider and to withdraw the rejection of Claims 1, 3, 11 and 18 under 35 U.S.C. 112.

Moreover, it is this dithering of the filter bandpass that distinguishes the invention patentably from the prior art. Specifically, the prior art does not disclose or suggest directing multiple wavelengths through the optical filter, dithering the bandpass of the filter about the wavelength of each channel in use in the network to obtain a measurement of the optical transfer function in the network, and using the filter output signals to compensate for changes in that optical transfer function.

As discussed in the present application, by dithering the filter bandpass, the invention can be effectively practiced using optical filers that are already part of the network, for example for add/drop functions. In addition, by using a filter in this way, the invention allows for a very fast response correction.

In the Office Action, the Examiner commented that Roberts discloses dithering the wavelength of each channel.

Roberts describes a method and apparatus for monitoring optical transmission systems by dithering the transmitted optical signal, tapping off and measuring both the dither and total optical power, and adjusting the relative signal power at each wavelength based on this information.

Importantly, however, Roberts does not disclose dithering the bandpass function of the filter.

This feature is also not disclosed in either Epworth, et al. or Jones, et al.

Jones, et al. describes a wavelength division multiplex system in which wavelengths can be added or dropped. As signals are added and dropped, adjustments are made to achieve or maintain some preferred signal level.

Epworth, et al. describes a method and system for controlling the frequency of a laser in an optical transmission system. The laser frequency is controlled on the basis of a determined phase quadrature.

The other references of record have been reviewed, and these other references, whether considered individually or in combination, also do not disclose or suggest this feature of the invention.

Independent Claims 1, 3, 11 and 18 describe important features that are not shown or suggested by the prior art. In particular, Claim 1 describes the feature of dithering the optical filter bandpass bout the center wavelength of each channel in use in the network to obtain a measurement of the optical transfer function (OTF) in the network at any instant in real time. In this way, as further described in Claim 1, when the OTF of the network is changed, that change is tracked and feedback signals are used to compensate for the change.

Claim 3 sets forth the step of tracking changes to the set of optical signals by passing each of the signals through a filter having a bandpass function, and dithering the filter bandpass about the wavelengths of each of the set of signals to generate filter output signals. Claim 3 describes the further step of using those filter output signals to compensate for those changes. Claims 11 and 18 both describe means to pass the set of optical signals through the filter, wherein the filter bandpass is dithered to generate filter output signals, and a control for using those output signals to compensate for changes to the optical signals.

Because of the above-discussed differences between Claims 1, 3, 11 and 18 and the prior art, and because of the advantages associated with these differences, Claims 1, 3, 11 and 18 patentably distinguish over the prior art and are allowable. Claim 2 is dependent from Claim 1 and is allowable therewith; and Claims 4-10 are dependent from, and are allowable with, Claim 3. Also, Claims 12-17 are dependent from, and are allowable with, Claim 11; and Claims 19 and 20 are dependent from Claim 18 and are allowable therewith. The Examiner is, thus, asked to reconsider and to withdraw the rejections of Claims 1-20 under 35 U.S.C. 103, and to allow these claims.

The changes requested herein to the claims only elaborate on features already described in the claims. For instance, Claim 1, 3, 11 and 18 are being amended to indicate expressly that the optical network is a multi-channel network, and that feedback signals or output signals from the dithered filter are used to compensate for changes in order to maintain a defined optical transfer function in the network. It is thus believed that entry of this Amendment is appropriate and such entry is respectfully requested.

For the reasons set forth above, the Examiner is asked to reconsider and to withdraw the rejection of Claims 1, 3, 11 and 18 under 35 U.S.C. 112 and the rejections of Claims 1-20 under 35 U.S.C. 103, and to allow these claims. If the Examiner believes that a telephone conference with Applicants' Attorneys would be advantageous to the disposition of this case, the Examiner is requested to telephone the undersigned.

Respectfully submitted,

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